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March 23, 1971

Attention: John C.

Dear John:

Enclosed please find three (3) copies each of the following:

Activity Summary No. 32

☐ 2201201-AS-32

Activity Summary No. 33

☐ 2201201-AS-33

Sincerely,

☐

Senior Staff Scientist

25X1

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Copy No. *b* of *a-d*

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To: John C.

From: [REDACTED]

Subject: Activity Summary
Facility Visit, Contract [REDACTED]

Reference: [REDACTED] 2201201-AS-32

Dates: March 10-11, 1971

On March 10-11, [REDACTED] visited the sponsor facility to view the status and accuracy of phase calibration work and start production of the phase masks for defocusing and image motion.

Calibration of phase as a function of density was completed by John. This was done by measurement of fringe shifts from interferograms made on the Mach-Zehnder interferometer. Densities of $1.55 \pm .05$ were found to give a phase shift of 50% when using light of 5461Å.

The first set of phase plates were exposed on 2"X2" High Resolution Plates. These plates had a non-uniform density across the format of interest. Further experimentation showed that the non-uniformity of the density was caused by plate edge effects (turbulence) in the development process. This problem can be solved by using larger photographic plates (4"X5"). Thus the area of interest 2"X2" in the center of the plate will be uniform within tolerances.

Methods for making and calibrating test imagery for defocused and image blurred photographs is included with this activity summary.

GROUP 1

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DEFOCUS TEST TARGET SPECIFICATIONS

Test targets of a specified amount of defocusing should be made to check out the resolution capabilities of the generated complex filters. Specifications for 8λ , 2λ and $1\frac{1}{2}\lambda$ defocusing will be given below.

To control the amount of defocusing in a camera system, the lens to film plane is increased or decreased an amount $b = 8\beta\lambda F_{no}^2$ from the infocus position.

b = motion distance in millimeters

β = the number of wavelengths of defocusing

λ = the wavelength of the light in the taking system (5×10^{-3} mm)

F_{no} = the effective F_{no} of the taking system

For $8\lambda - b = .320 F_{no}^2$ eff.

$2\lambda - b = .08 F_{no}^2$ eff.

$1.5\lambda - b = .075 F_{no}^2$ eff.

The effective F_{no} is calculated as follows:

1. Specify the lens focal length
2. Specify the system magnification
3. From the above, calculate the lens to image plane distance.
4. Specify a lens $F_{no} = 4$
5. From the above calculate the aperture diameter (D)

$$D = \frac{\text{Lens Focal Length}}{\text{Specified } F_{no}}$$

6. The effective F_{no} will now be the lens to image plane distance divided by the aperture diameter.

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To insure the proper amount of defocusing a three bar resolution target should also be exposed under the same conditions. The first zero of this target can be read directly from the negative and should occur at the following point.

$$\text{First Zero } \alpha_1 = \frac{1.22}{8\lambda F_{\text{eff}}^{\#} \beta}$$

IMAGE BLUR TEST TARGET SPECIFICATIONS

Filters are being made to correct image blur of the following amounts: 8.3 μ , 12.5 μ , 16.7, 25 μ , 33 μ and 50 μ . For test imagery all this requires is motion in the object plan equal to the amount of image blur times the scale factor of the imaging system. For example, if a target is to contain 33 micrometers of image blur and the system scale is 8 then the motion in the object plane will be (33) (8) or 264 micrometers.

A pinhole should be placed in the original target when making these test targets. This will be used to calibrate the amount of image blur since the pinhole will become a short line equal to the amount of image blur when photographed in the system.

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Contract to

[Redacted]

Copy No. a

a-l

FORM 1 CONTRACT STATUS REPORT (Rev. 10-65) 1

Contract Period 1 February 1971 to 28 February 1971 March 12,

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Contract No. [Redacted] Task No. 02 Project No. [Redacted] 220120

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Period of Contract 20 April 1970 to 19 April 1971

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Amount of Contract :

Amount of Obligations
and/or Expenditures This Period:

Amount of Obligations
and/or Expenditures to Date :

Estimate of Funds to Complete :

[Redacted]

Percentage of Funds Expended to date 82.3

Percentage of Work Completed to date 82.3

(Note: All amounts shown must include overhead, G&A, handling charges, fees, etc.)

1. Is work on schedule? yes (Attach sheets if necessary)
2. Can the Contract be completed in the authorized time? yes
3. Can the Contract be completed with the authorized funds? yes

Comments: (Attach sheets if necessary)

Technical Progress in Period: (Attach sheets if necessary)

Refer to Technical Progress Report No. 10
[Redacted] 2201201-TPR-10

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Technical Progress for the Next Period: (Attach sheets if necessary)

Refer to Technical Progress Report No. 10
[Redacted] 2201201-TPR-10

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Submitted by

[Redacted]

NOTICE

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March 12, 1971

Attention: John C.

Dear John:

Enclosed please find one copy of Monthly Contract Status
Report No. 10, /2201201-MCSR-10.

Sincerely, ,



Senior Staff Scientist

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